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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/807,413	03/24/2004	Taichiroo Konno	035532-0140	3864
22428	7590	06/08/2005	EXAMINER	
FOLEY AND LARDNER SUITE 500 3000 K STREET NW WASHINGTON, DC 20007			MONDT, JOHANNES P	
			ART UNIT	PAPER NUMBER
			2826	

DATE MAILED: 06/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

E/C

Office Action Summary

Application No.

10/807,413

Applicant(s)

KONNO ET AL.

Examiner

Johannes P. Mondt

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 3/24/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

This office action is in response to the filing of the Application on 3/24/04.

Information Disclosure Statement

The examiner has considered the item listed on the Information Disclosure Statement filed 3/24/05. A signed copy of the substitute Form PTO-1449 is herewith enclosed.

Specification

The Specification is objected to for referring to element 6 as element 6A (see page 3, line 23, page 4, line 12, page 5, line 15). In all cases a single numeral should be used to refer to what is element 6 in the Drawings (see Figure 1 and Figure 3).

Furthermore, in the Abstract the wording "determination" (final line) should be replaced by "determining".

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. ***Claim 12*** recites the limitation "the AlGaAs layer" in line 3. There is insufficient antecedent basis for this limitation in the claim.
3. ***Claim 14*** recites the limitation "the AlGaAs layer" in line 3. There is insufficient antecedent basis for this limitation in the claim.
4. ***Claim 16*** recites the limitation "the AlGaAs layer" in line 3. There is insufficient antecedent basis for this limitation in the claim.

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5. **Claim 18** recites the limitation "the AlGaAs layer" in line 3. There is insufficient antecedent basis for this limitation in the claim.

6. **Claim 20** recites the limitation "the AlGaAs layer" in line 3. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. **Claim 1, 3, 5, 7 and 9** are rejected under 35 U.S.C. 102(b) as being anticipated by Jou et al (5,869,849). Jou et al teach a light emitting diode comprising: a semiconductor substrate 540 (col. 3, l. 54); a light-emitting region 530 including an active layer 532 provided between a first conductivity type cladding layer 533 and a second conductivity type cladding layer 531 (col. 3, l. 45-55); a transparent conductive film 570 made of a metal oxide (indium-tin-oxide or ITO: col. 4, l. 23-24) and located over the light-emitting region; a first electrode 560b (col. 4, l. 26-28) on the upper side of the transparent conductive film; a second electrode 550b (col. 4, l. 25-26) formed on the whole or a part of the bottom of the semiconductor substrate; and a layer 520 of AlGaAs (col. 4, l. 52-55) capable to prevent exfoliation in comparison with the prior art by virtue of having a greater impurity concentration (namely: greater than 10^{18} cm^{-3}) (col. 4, l. 53-58), being made of a compound semiconductor containing at least aluminum and located between the light-emitting region 530 and the transparent conductive film 570.

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Applicant is reminded that the limitation "for preventing...." constitutes functional language. In reference to said limitation, intended use and other types of functional language must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963).

On claim 3: the preventing layer has a thickness of a little as infinitesimally over 50 nm (col. 4, l. 53-58).

On claim 5: the transparent conductive film is made of indium tin oxide (cf. col. 4, l. 23-24).

On claim 7: the "preventing" layer is made of an arsenic compound, namely AlGaAs (a/o) (col. 4, l. 53-54).

On claim 9: the light emitting region is made of $(\text{Al}_x\text{Ga}_{1-x})_y\text{In}_{1-y}\text{P}$ (col. 3, l. 45-55).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. ***Claims 2, 4, 6, 8 and 10*** are rejected under 35 U.S.C. 103(a) as being unpatentable over Jou et al (5,869,849) in view of Okazaki et al (6,495,862 B1) and Tsuda et al (US 2005/0095768 A1). As detailed above, Jou et al anticipate claim 1. Jou et al do not necessarily teach the further limitation defined by claim 2. However, it would

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have been obvious to include said further limitation because in a patent on contact layers in contact with transparent electrodes in light-emitting diodes to prevent exfoliation (abstract, Figure 1 col. 3, l. 65 – col. 5, l. 14) Okazaki et al teach the equivalence of GaN and AlGaAs layers as contact layers contacting p-side transparent electrodes suitable to prevent exfoliation of GaN and of AlGaAs, the selection rather depending on the constitution of the active layer (col. 13, l. 8-25). Although Okazaki et al do not specifically teach a range for the impurity concentration, impurity concentrations of 10^{19} cm^{-3} are evidently common in the art of making contact regions, as witnessed by Tsuda et al, citing a value of 10^{20} cm^{-3} for said impurity concentration ratio for a p-side GaN contact doped with Mg (see [0143]). Motivation to select AlGaAs in the case of the application to GaAs based light emitting diodes and the selection of an impurity concentration well over 10^{19} cm^{-3} thus is seen to involve only ordinary skills in the art. Applicant is reminded in this regard that it has been held that mere selection of known materials generally understood to be suitable to make a device, the selection of the particular material being on the basis of suitability for the intended use, would be entirely obvious. In re Leshin 125 USPQ 416.

On claim 4: the preventing layer has a thickness of a little as infinitesimally over 50 nm (col. 4, l. 53-58).

On claim 6: the transparent conductive film is made of indium tin oxide (cf. col. 4, l. 23-24).

On claim 8: the “preventing” layer is made of an arsenic compound, namely AlGaAs (a/o) (col. 4, l. 53-54).

On claim 10: the light emitting region is made of $(\text{Al}_x\text{Ga}_{1-x})_y\text{In}_{1-y}\text{P}$ (col. 3, l. 45-55).

5. **Claims 11, 19, 21 and 23** are rejected under 35 U.S.C. 103(a) as being unpatentable over Jou et al (5,869,849) in view of Temkin et al (Journal of Applied Physics 51(6), 3269-3272 (1980)). As detailed above, Jou et al anticipate claim 1. Jou et al do not necessarily teach the further limitation defined by claim 11. However, the advantage of having a stoichiometric parameter x within the range of a direct band gap (x between 0 and 0.45) has long been known to be vital to having low resistance for the ohmic contact, as seen from Temkin et al (see abstract, Figure 1 and Experimental section), who thus recommend the range between 0 and 0.45 for x . Motivation to include the teaching of this range at least stems from the very purpose of ohmic contact regions to provide low resistance contact to the electrodes. Furthermore, considering the substantial overlap of the claimed range with the one found in the prior art by Temkin et al at the very least constitutes a prima facie case of obviousness.

On claims 19 and 21: the further limitations of claims 19 and 21 fail to further limit the light emitting diode but instead only limit its method of making. Therefore, the further limitations of claims 19 and 21 fail to distinguish the light emitting diode over the prior art.

On claim 23: the light emitting region is made of $(\text{Al}_x\text{Ga}_{1-x})_y\text{In}_{1-y}\text{P}$ (col. 3, l. 45-55).

6. **Claim 13** is rejected under 35 U.S.C. 103(a) as being unpatentable over Jou et al and Temkin et al as applied to claim 11 above, and further in view of Okazaki et al (6,495,862 B1) and Tsuda et al (US 2005/0095768 A1).. As detailed above, claim 11 is

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unpatentable over Jou et al in view of Temkin et al, neither necessarily teaching the further limitation as defined by claim 13. However, it would have been obvious to include said further limitation because in a patent on contact layers in contact with transparent electrodes in light-emitting diodes to prevent exfoliation (abstract, Figure 1 col. 3, l. 65 – col. 5, l. 14) Okazaki et al teach the equivalence of GaN and AlGaAs layers as contact layers contacting p-side transparent electrodes suitable to prevent exfoliation of GaN and of AlGaAs, the selection rather depending on the constitution of the active layer (col. 13, l. 8-25). Although Okazaki et al do not specifically teach a range for the impurity concentration, impurity concentrations of 10^{19} cm^{-3} are evidently common in the art of making contact regions, as witnessed by Tsuda et al, citing a value of 10^{20} cm^{-3} for said impurity concentration ratio for a p-side GaN contact doped with Mg (see [0143]). Motivation to select AlGaAs in the case of the application to GaAs based light emitting diodes and the selection of an impurity concentration well over 10^{19} cm^{-3} thus is seen to involve only ordinary skills in the art. Applicant is reminded in this regard that it has been held that mere selection of known materials generally understood to be suitable to make a device, the selection of the particular material being on the basis of suitability for the intended use, would be entirely obvious. In re Leshin 125 USPQ 416.

7. **Claims 15 and 17** are rejected under 35 U.S.C. 103(a) as being unpatentable over Jou et al and Temkin et al as applied to claim 11 above, and further in view of Okazaki et al (6,495,862). As detailed above, claim 11 is unpatentable over Jou et al in view of Temkin et al, neither necessarily teaching the further limitation defined by claim

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15. However, as shown by Okazaki et al the use of Mg (or Zn or C a/o) as metal dopants of a p-type contact layer for the prevention of exfoliation has long been recognized in the art of light-emitting diodes (col. 6, l. 4-40) (note AlGaAs contact layers are alternatively included in Okazaki's teaching: col. 13, l. 8-25). *Motivation* to include the teaching by Okazaki et al at least derives from the success in the anneal step described in col. 6 to accomplish a high impurity concentration and a consequent strong reduction in resistivity of the ohmic contact. With regard to claim 17: the additional limitation in comparison with claim 15, namely that "C is autodoped" fails to further limit the light emitting diode as final structure but instead merely limits a making of making.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Johannes P. Mondt whose telephone number is 571-272-1919. The examiner can normally be reached on 8:00 - 18:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan J. Flynn can be reached on 571-272-1915. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JPM
May 30, 2005

Patent Examiner:

A handwritten signature in black ink, appearing to read 'J. Mondt', is written over a horizontal line.

Johannes Mondt (Art Unit: 2826)